VII. SYNTHESIS

The major research focus of the Wilmington Boulevard Mitigation Program was to study the effects of industrialization on the spatial distribution of land use activities and socio-economic group residences over time and on the consumer behavior of the city's historic residents. The various phases of the mitigation program, discussed in the preceding chapters, have produced a large data base for addressing this research domain.

Hypothesis 1

The project's research domain is addressed by testing four hypotheses on historic settlement patterning and consumer behavior in Wilmington. The first hypothesis stated that in the pre-industrial period there was a mixed land use pattern in the project area, and in the city as a whole. During the industrial period, beginning around 1840, there would be a tendency for land-use types to separate out in the city landscape. By the height of the industrial period, after the Civil War, this land use separation would become more pronounced than in earlier periods.

To support this hypothesis, historical data should demonstrate an increase in single-use properties, non-owner occupied properties, and strictly commercial properties over time, within the project area, with a concomitant decrease in residential occupancy. Also, in the pre-industrial period, commercial and residential properties will abut each other, or be located within the same lot, while in the industrial period, this will not be the case.

Collected historical data tend to support this hypothesis, but demonstrate that the hypothesis is too simplistically stated. Prior to 1800, it appears that single use structures were not the norm. This pattern of mixed land use, with businesses and residences at the same locale, continued through the middle of the nineteenth century. However, by the height of the industrial period, workers, especially skilled workers, were working in one place and living in another. By 1890, it was common practice for people to work and live in separate places. Even though there is an increase in single use properties after the Civil War, the overall land use pattern in the project area was mixed. The project area, from its earliest development, had a mixture of residential and commercial properties, but residential land use predominated before 1800 (Figure 73). By the 1810s, more commercial establishments were present (Figure 74). This pattern of increasing commercialization continued throughout the nineteenth century (Figure 75), with commercial properties predominating in the project area by 1880 (Figure 76). However, residential properties continued to exist in the area, often alongside or perhaps above commercial establishments.

Historical data on land tenure for testing this hypothesis was incomplete. Tenancy data for the eighteenth century was insufficient for any interpretations. However, data from the nineteenth century suggested that occupancy by tenant tended to be denser than occupancy by landowner.

These data suggest that the postulated transitional period from a pre-industrial to an industrial period, circa 1840 and 1850, did not exhibit any

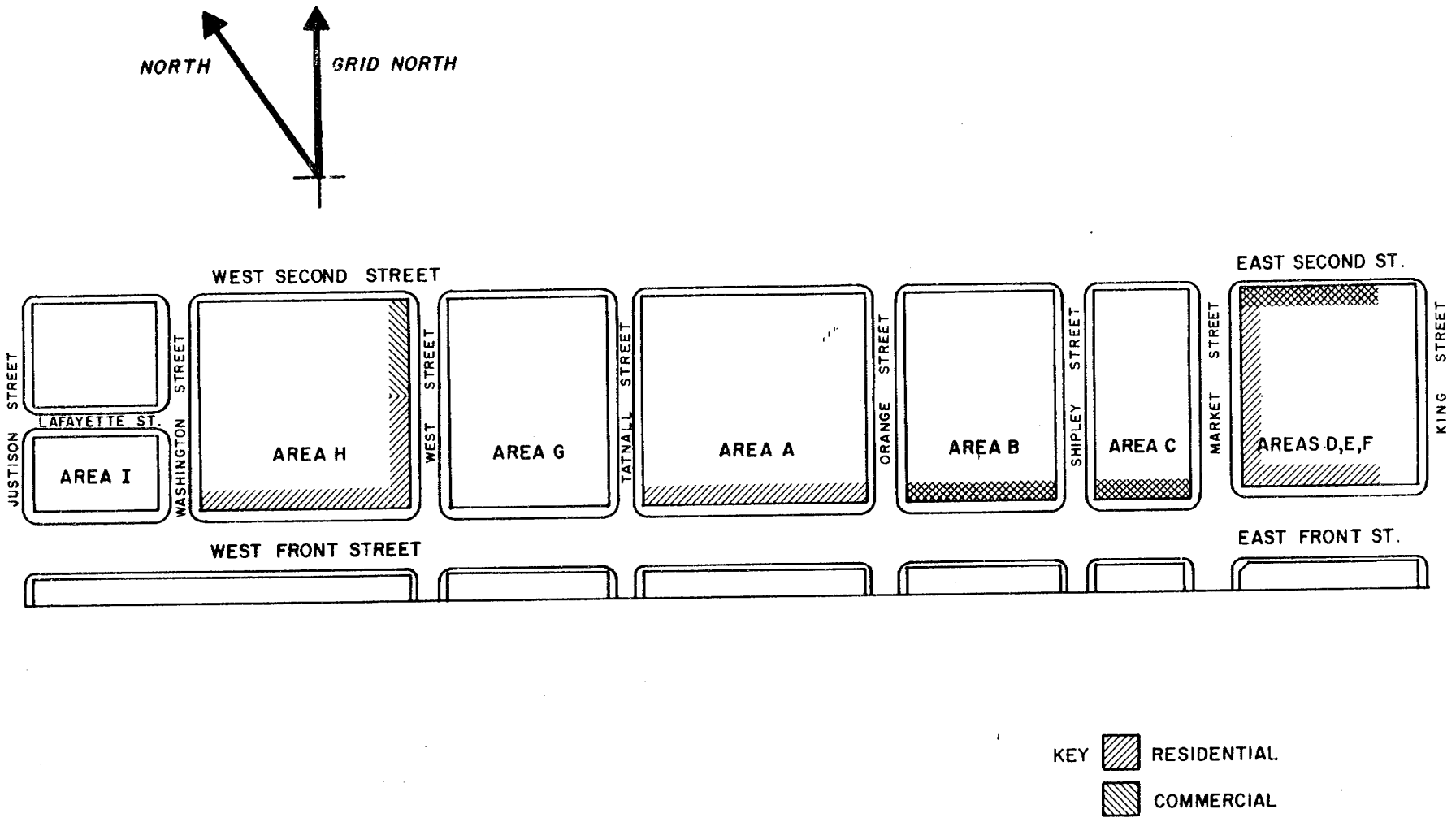

FIGURE 73
DISTRIBUTION OF
LAND USE ACTIVITIES
1730's TO 1810

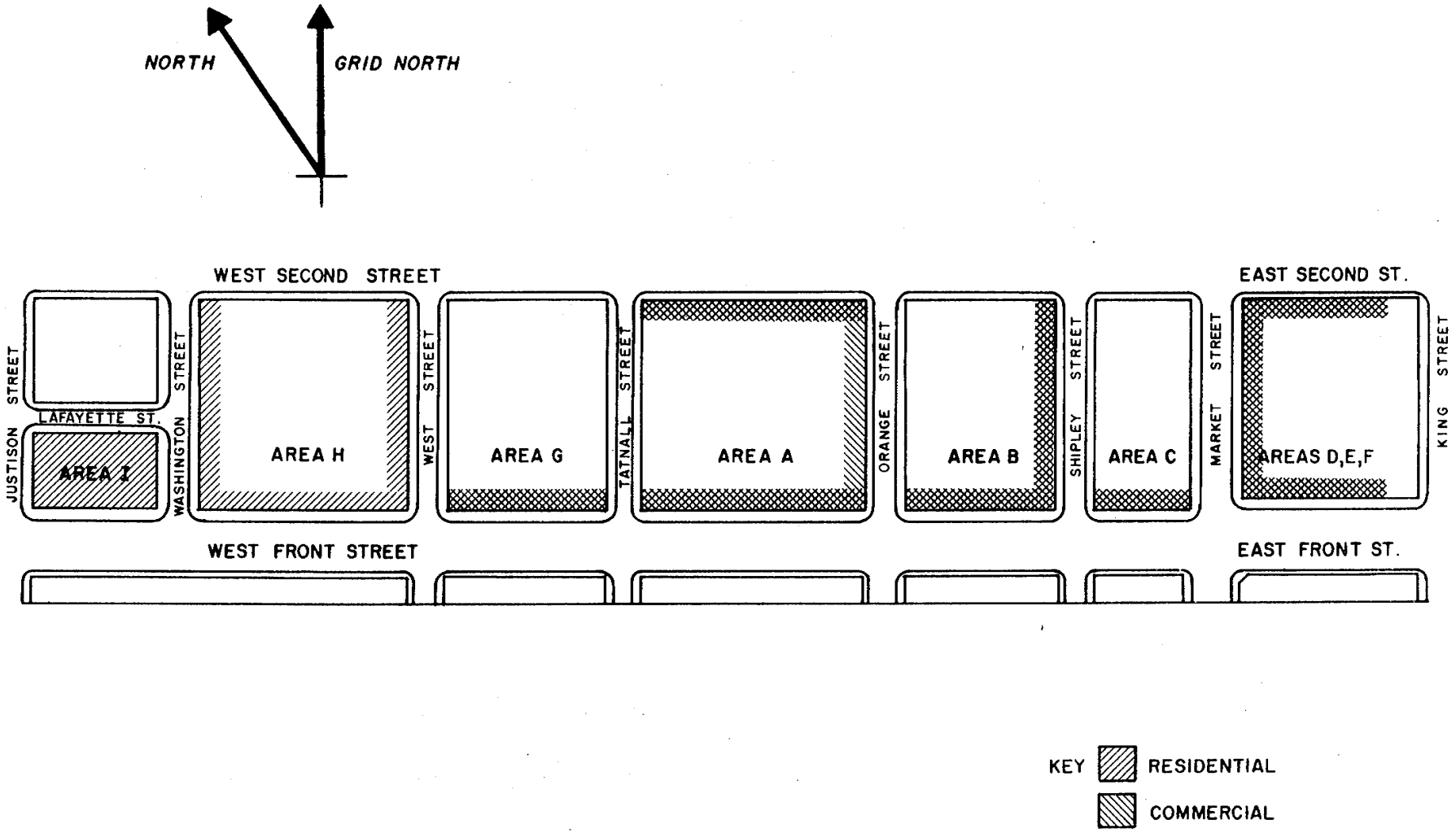

FIGURE 74

DISTRIBUTION OF
LAND USE ACTIVITIES
1810 TO 1840's

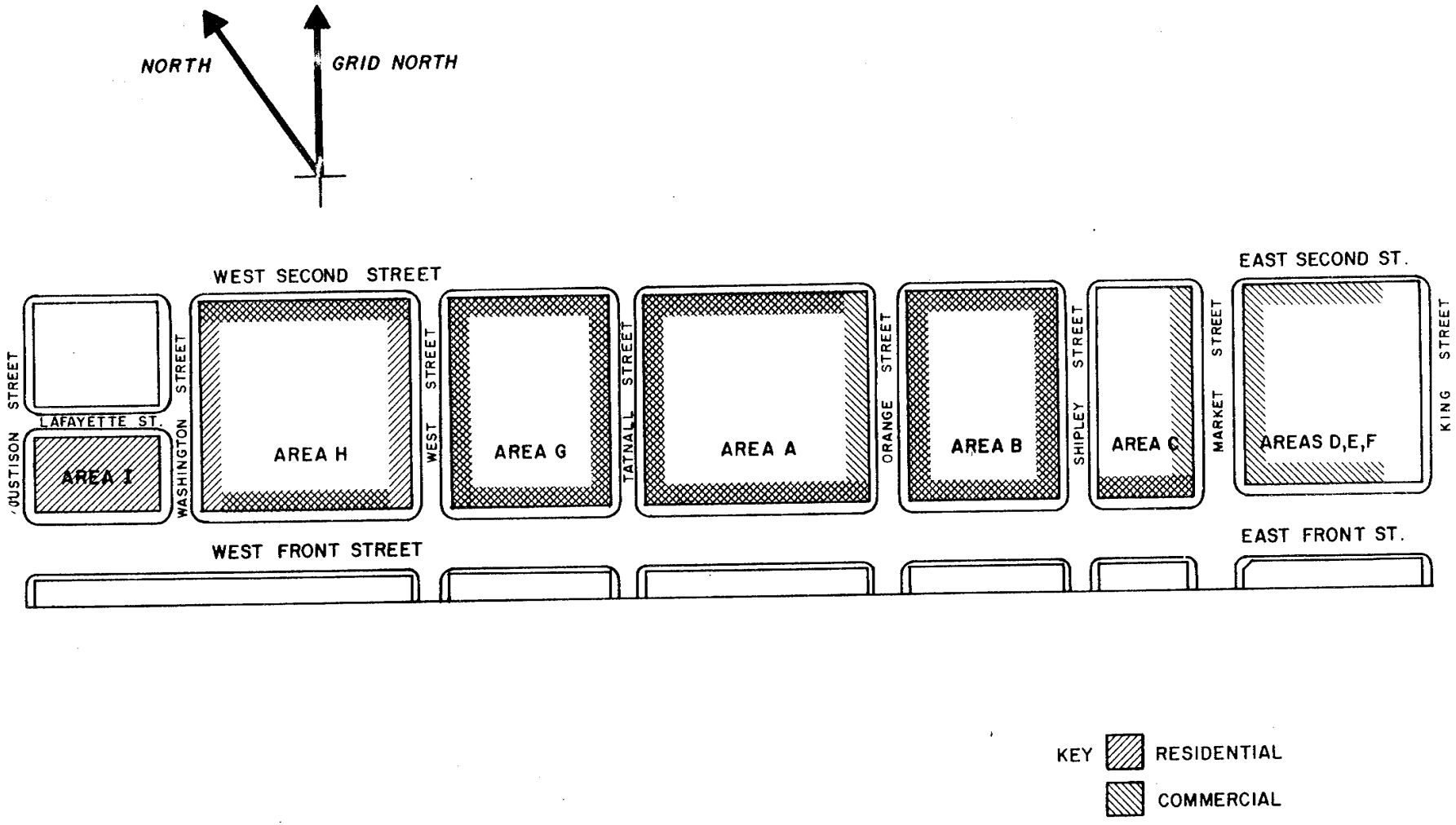

FIGURE 75

DISTRIBUTION OF
LAND USE ACTIVITIES
1840's TO 1870's

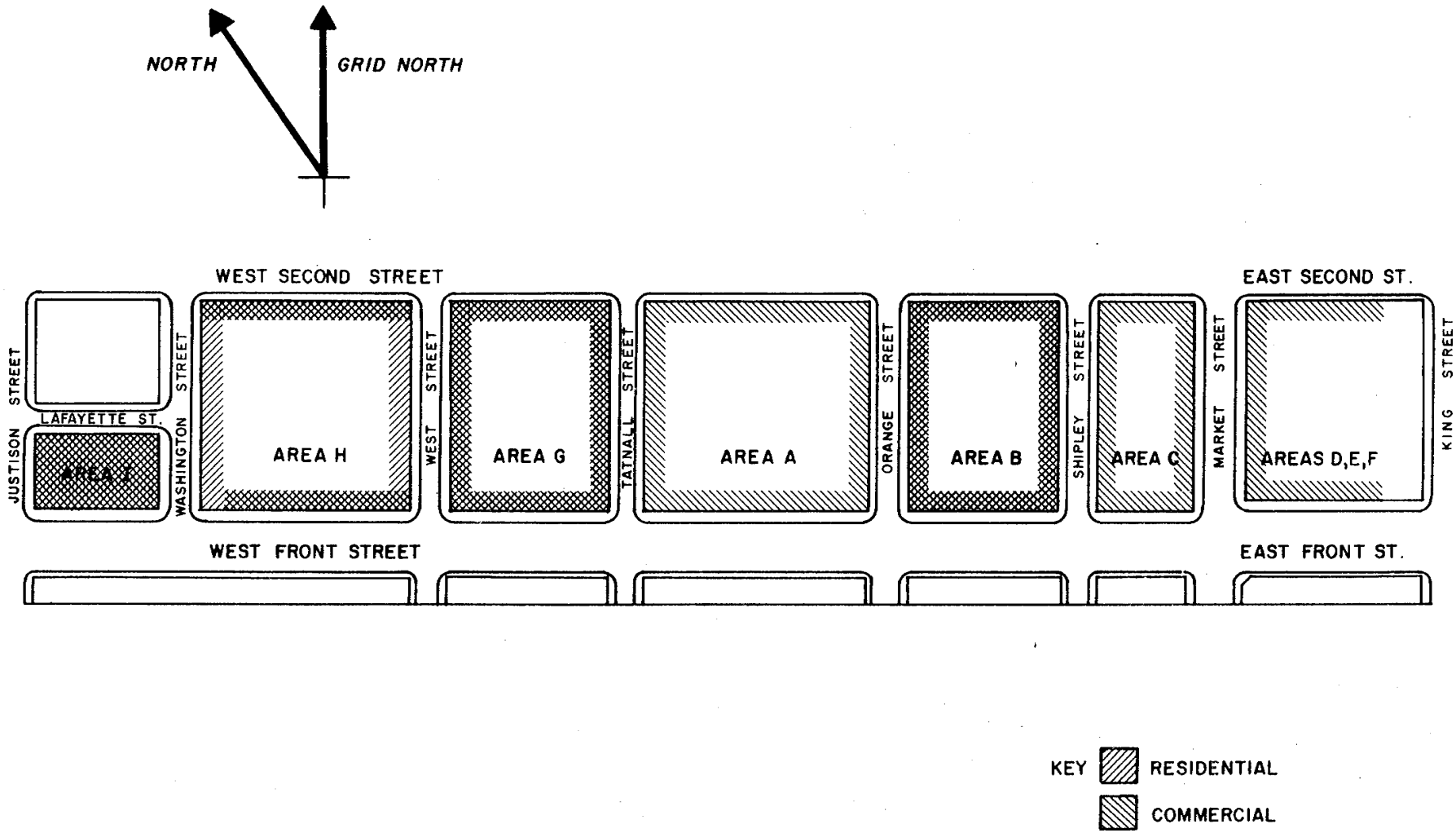

FIGURE 76

DISTRIBUTION OF
LAND USE ACTIVITIES
1870's TO 1900

dramatic changes in the spatial distribution of land use types. In fact, changes in the project area occurred before this period, as seen in the increased commercialization of parts of the project area, especially properties on Market Street, during the 1810s. As demonstrated in the History chapter, the period from 1790 to 1837 exhibited a city-wide economic base tied to manufacturing, and not large-scale industrialization. This early change in land use patterning in the project area appears to have been related to the change from the market center economic base, of the eighteenth century, to the increasing manufacturing economic focus of the early nineteenth century.

The hypothesized segregation of land use types was not really evident until after the Civil War, when commercial properties predominate in the project area. This was a period of great expansion in industrialization in Wilmington, in what we refer to as the Mature Industrial period.

Therefore, industrialization and its temporal manifestation, as defined in the Research Perspective chapter, do seem to correlate with land use changes in the city, but only during its full manifestation in the Mature Industrial Period, not during the Early Industrial Period, beginning in the 1840s.

There was also a change in land use patterning prior to this period, during the increasing manufacturing focus of Wilmington's private enterprises, during the beginning of the nineteenth century. One could argue that this manufacturing period was indeed industrial. At this time, water-powered industries along the Brandywine greatly increased, and the city, for the first time, physically expanded. In fact, our project historian has placed this manufacturing period within the larger temporal division of "Industrial". It is possible that our definition of this process has masked the importance of the incipient stage of industrial development, which without question occurs in the Northeast at the turn of the nineteenth century. Thus, to study the effects of industrialization on settlement patterning in cities such as Wilmington, one must look at its initial stages, not just the period when it is the predominant factor in a city's economic base.

Archaeological data to support this hypothesis on changes in land use patterning are as follows: In the pre-industrial period, lots will contain materials from domestic activities and will be adjacent to lots with a preponderance of commercial related artifacts, or the lots will contain materials from both commercial and residential activities. Material within lots dating to the industrial period, will contain a low frequency of domestic related artifacts, or the frequency of such materials will be low in the project area, as compared to commercially related materials. In addition, lots containing residential artifacts will abut other lots with similar artifact assemblages. The same pattern will be evident with lots containing commercially related materials.

The artifactual evidence suggests that the expected changes in land use patterning occurred during the Mature Industrial period, as shown in the historical analysis. In addition, there are data that indicate that land use changes occurred during the 1810s, which is also suggested by the historical data. The 1840 to 1850 period was not one of significant changes, based on the artifactual evidence.

The artifact pattern analysis clearly demonstrates that three land use categories were present in the project area: residential, commercial, and mixed residential and commercial. The pre-industrial period occupation levels exhibited a purely domestic artifact pattern, as did the MAAR feature on Area E, and Feature 27 in Area A. These deposits contained a very high percentage of Kitchen group artifacts, with ceramics as the predominant artifact class. The material in Feature 1 in Area D also contained domestic material, prior to the 1810s. However, commercial and residential materials were deposited in the feature after this time.

The artifactual material from these deposits suggests that domestic land use predominated prior to the 1810s followed by an increase in commercially related materials and thus land use activities.

Deposits and features dating to the postulated industrial period (circa 1840) exhibited both commercial and domestic artifact patterns. The Dowdall deposits, dating circa 1850, were derived from a combined domestic and commercial occupancy. This is only apparent when the artifact classes within the Kitchen group are examined. The two features from Area H, dating to circa 1860, also contained both domestic and commercial materials and fit within Garrow's "Public Interaction Pattern". The industrial period occupation levels may well have been derived from combined commercial and domestic occupations. Though the overall pattern is similar to the pre-industrial occupation levels, the bottle glass counts for the industrial period levels (i.e. post 1840) were higher. This suggests that the presence of "dangerous" artifactual materials in the rear of these later properties was not as much a concern as in the earlier occupations. This suggests that these later deposits exhibited a commercially related discard pattern, as is evident in modern commercial properties, where the rear of the property does not experience extensive traffic, and thus does not need to be cleared of trash that may cut or hurt individuals using the rear yard areas.

The only purely commercial deposit was Feature 19 in Area A. The constituents of the Kitchen group artifacts showed that the feature was not associated with a domestic occupation, that the artifacts were discarded by workmen of the fertilizer company that occupied the lot at the end of the nineteenth century. It is interesting that Feature 19 in Area A was the only analytical deposit that dated after 1860. The historical data on land use in the project area, after 1860, showed that the majority of properties were commercial in nature, but few archaeological materials from these properties were recovered. This absence of material in analytical contexts may be related to the highly commercial character of the project area at this time, and may ultimately prove to be a signature for purely commercial properties.

Data from the functional group analysis and the minimum vessel counts provided additional information on the land use activities within the project area. The contexts from Areas D and H showed a very high food service percentage. This suggests that domestic activities occurred in these two areas. There were insufficient data on Feature 27 in Area A to use the functional group analysis in a study of land use on the lot during the feature's use life. The functional group analysis conducted on the Dowdall materials clearly demonstrated that the artifacts in the three features were derived from commercial activities (Feature 17), domestic activities (Feature 15,

which contained materials from both the Dowdall household and from food preparation and service for the bottling workers), and both commercial and domestic activities (Feature 25). Feature 19 in Area A exhibited functional groups consistent with the commercial nature of the property in the last quarter of the nineteenth century.

Combining the results of the pattern analysis and the analysis of functional groups, there appears to have been a change in land use patterning within lots in the project area. Prior to the 1810s, the predominant land use is domestic. This is followed by an increase in mixed commercial and residential properties. For example, Feature 1 in Area D exhibits a domestic artifact pattern, in terms of the artifact group and class analysis and the functional group analysis, for the assemblage dating prior to 1810. However, there is evidence in the Activities group artifacts that a commercial establishment was present on the lot during the use life of the cistern/privy. Historically, we know that the lot changed from strictly residential to both residential and commercial by 1814. This mixed land use is reflected in the artifact patterning.

This mixed land use patterning is also evident in the archaeological material from the project lots dating to the middle of the nineteenth century, as exemplified by the industrial period occupation levels and features in Areas A and H.

There was then a second period of change after 1860, in which the land use activities in the project area did not produce domestic artifactual materials, nor were other types of functionally identifiable materials being deposited in the archaeological record. Historically, this period experienced a continual increase in commercial properties in the project area. Thus, the second observed change in the artifact patterning, i.e. absence of material, may be related to this increased commercial character. It should be noted, that this increased commercial character took place during the Mature Industrial Period.

There are no data on the nature of land use types of adjacent lots, from the archaeological materials recovered during this project. Thus, the test implications for the hypothesis dealing with land use type placements within blocks and street faces cannot be addressed. This does not, however, impede the testing of this first hypothesis, as the pattern analysis and the analysis of artifact functional groups provided sufficient data. These latter analyses demonstrated that there was a change in land use patterning, but probably in the Mature Industrial Period and not during the 1840-1850 period postulated in the hypothesis. In addition, there was an earlier land use change around the 1810s. Both of these land use changes were seen in an increase in commercial properties in the project area, beginning in the 1810s and then intensified in the Mature Industrial Period, during the 1870s and 1880s. Industrialization, as defined earlier, does not seem to have influenced the nature of artifact patterning in the archaeological record. The primary factor in pattern change in our postulated pre-industrial and industrial periods was a change in land use type, i.e. function. In turn, the initial change in lot function, seen around the 1810s, was probably the result of the change from a marketing economic base in Wilmington, to a manufacturing one. In the analysis chapter, we stated that the Wilmington deposits had

sufficient points of differentiation to demonstrate distinctive artifact patterns for the pre-industrial versus the industrial periods, and that these differences were related to changes in lot function. It should be noted that those deposits tied to the "pre-industrial period" almost all date to prior to 1810. Industrial period deposits date to after the 1830s. The temporal clustering of these deposits fall on either side of what we now see as the critical period of around 1810, which may now be conceived as the initial period of industrialization in Wilmington, at least in the appearance of water powered industry and the establishment of organizational frameworks within local governments and enterprises conducive to later full industrial development (History chapter). Thus, this statement in the Analysis chapter remains correct.

In summary, the historical data suggest that changes in land use occurred during the transition from a marketing economy to a manufacturing one (i.e. early or incipient industrial), establishing a pattern of increasing commercialization within the project area. This increasing commercialization then became most prominent in the Mature Industrial Period. The artifactual analysis concurs with this historical interpretation. Land use in the project area begins with a predominantly domestic character, followed by an increasingly mixed commercial and residential one in the early nineteenth century. This is followed by a predominance of commercial properties after 1870, but with residential land use still present, but to a much lesser degree than in earlier periods. These conclusions partially support the first hypothesis. However, the hypothesized timing of these changes involving industrialization, and the importance of the different stages of this critical process, appears to have been incorrect.

Hypothesis 2

The second hypothesis, addressing changes in settlement patterning in Wilmington, states that there was a greater physical distance between socio-economic group residences in the industrial period than in the pre-industrial period. To support this hypothesis with historical data, we should observe a heterogeneous population of different socio-economic groups occupying the project area in the pre-industrial period. By 1840 and 1850, there would be an increasing spatial separation of individuals of different groups, whereby street faces and abutting lots would be occupied by individuals of the same socio-economic group. Also, there would be a decrease in the number of socio-economic group types in the project area, with only one or two types residing in the area during the industrial period.

As discussed in the Research Perspective and History chapters, the historical identification of socio-economic group affiliation is based on occupation, ethnic affiliation, and land tenure. In fact, the historical research found a tentative correlation between owner occupancy and the location of residences associated with individuals falling into the upper level occupation categories.

The collected historical data demonstrated that up to the 1830s and 1840s, residential segregation by occupational groups within the city, was fairly weak. However, within the project area, Areas D and A had a tendency to contain the higher level socio-economic groups, especially on those lots

fronting on Market Street. By 1814, the character of Market Street changed. The high level socio-economic groups left the project area. Their residences were filled by middle level groups. Thus, prior to 1840, the project area exhibited a mixed socio-economic group character, with a clustering of upper level groups on a couple of street faces until 1814. During what is defined as the Early Industrial Period in the History chapter, there was an important change in the settlement patterns of socio-economic groups in the city as a whole. The 1845 assessment indicated the appearance of skilled and manual worker residential areas near the Brandywine. These residential areas did not exist earlier, and when created, did not contain high level socio-economic groups. Thus, by 1845, a "segregated" residential area existed in Wilmington. The development of this area was most likely due to the growth of industries on the Brandywine River. During this time, the project area retains its heterogeneous character, with the absence of high level socio-economic group residences, though individuals in this category could still be found in the project area, scattered among the other socio-economic level households. From this period, there is a tendency in the project area for the residents to fall within the lower socio-economic categories, but these individuals do not predominate until the very end of the nineteenth century. At this time, circa 1880 and 1890, the project area fell within a band of almost solid manual workers occupying the blocks nearest to the railroad. In addition, this was the period of suburb development. The middle level households left the inner city and moved to areas once occupied only by the high level socio-economic groups.

The historical data suggest that a relatively heterogeneous city persisted throughout the nineteenth century, up to the 1890s, except for the appearance of strictly manual and skilled worker residential areas in 1845. The small enclaves of free blacks which existed in the early and middle nineteenth century coincided closely with general concentrations of semi-skilled and lower level manual workers, and did not constitute segregated black areas.

These historical data tend to support the hypothesis in terms of the types of changes that were expected, but the time frame for these changes was more complex than expected. Before 1840, the project area was characterized by a heterogeneous population, with some residential clustering in Areas D and A. There was no real increase in the spatial separation of different groups in the city as a whole, but a "segregated" new residential area of skilled and manual workers appeared in the northern part of the city. As postulated in the hypothesis, there is a gradual decrease in the number of socio-economic groups in the project area over time, but this decrease becomes prevalent only by 1880 and 1890.

The test implications did not predict the movement of high level socio-economic groups from the project area by 1814. The movement of these households coincides with the increased commercialization within the project area, identified earlier in this chapter. There was undoubtedly some type of correlation between these two events.

The archaeological test implications for this hypothesis on socio-economic group residences state that in the project area, materials indicative of different socio-economic group levels would be equally distributed in the area in the pre-industrial period. In addition, materials dating to the

industrial period, would indicate the presence of only one or two types of groups in the project area, with low level groups predominating.

The Miller analysis, discussed in the Artifact Analysis chapter, was used in addressing these test implications. Unfortunately, the sample of deposits suitable to the Miller analysis was inadequate for a comprehensive spatial study of socio-economic groups in the project area. Only one feature from the pre-industrial period, Feature 1 in Area D, was suitable. There was a larger sample of analytical contexts from the industrial period: three from the Dowdall property and two from Area H. What can be said about the archaeological data on the spatial distribution of these groups, is that the Miller analysis for Area D, Feature 1, supports the presence of upper level socio-economic household on this lot fronting on Market Street, with the cautionary note that this deposit probably also contained materials from a middle to low level socio-economic group that occupied the lot in the 1810s. The Miller analysis of the industrial period contexts indicate the presence of only middle and lower level groups, which does coincide somewhat with the historical data.

Of particular note was the surprisingly high Miller index value for Level 2A in Feature 2, Area A, dating to circa 1860. This index does not conflict with the historical interpretation of a mixed socio-economic group residential area in the project area at this time period. However, it is contrary to specific historical data on the study lot. This will be discussed further in the discussion of the third hypothesis.

In summary, the historical, and what archaeological data was available, generally supports the second hypothesis. There was a greater physical distance between socio-economic residences over time. However, the temporal occurrence of this residential separation was different than expected, plus other changes in socio-economic residences occurred which were not predicted in the test implications for this hypothesis. Prior to the 1810s, the project area exhibited a mixed residential character. There was, however, a cluster of high level socio-economic households in Areas A and D. By 1814, these high level groups left the project area. This is, of course, prior to our postulated pre-industrial and industrial transition period of 1840 to 1850. As discussed above, the 1810s fell within what the project historian had defined as the city's manufacturing period. This period exhibited a different economic focus than earlier periods, which were mercantile in nature. Thus, the increase of manufacturing in Wilmington seems to correlate with changes in socio-economic group residency, and as discussed above, general land use patterning. In fact, all three of these variables appear to be correlated in terms of a complex feedback system.

There was no apparent change in residential patterning in the project area during the postulated pre-industrial/industrial transition period circa 1840. There were, however, changes in other parts of the city. At this time, new, homogeneous residential areas appeared near the Brandywine industries. Thus, there seems to be some correlation with the appearance of industrialization as defined earlier in this report, and residential patterning of skilled and manual workers. The other residential categories, however, retained their 1810 configuration.

The next period of change was during the Mature Industrial Period, in which the project area contained strictly lower level groups, with the upper level groups leaving the inner city, and residing in the growing suburbs. It is only at this time, that the city's residential areas can be characterized as truly segregated. Industrial growth and maturity probably were factors in this late nineteenth century residential pattern, where the location of factories affected the location of workers' neighborhoods, as was found in Philadelphia (Greenberg 1981a and b). The exodus of middle and upper level groups from the city's core was probably due to the decreasing environmental quality of the growing industrial inner city, and the existence of suitable city wide transportation systems. It should be noted, however, that this movement out of the core area began as early as 1810 in Wilmington, and the linkage between worker residences and factory locations existed by 1845.

Hypothesis 3

The third and fourth hypotheses address changes in consumer behavior of Wilmington's historic inhabitants. Hypothesis 3 states that in the pre-industrial period, individuals and households of a high socio-economic level used materials of higher quality (cost) than those used by middle and lower level groups. This material difference would also have existed between middle and lower level groups, but to a lesser degree. In the industrial period, these material distinctions between the groups would become more pronounced, with middle level groups using materials closer in quality to those used by the high level group households, than to those used by the lower level groups.

Only archaeological data were used to test this hypothesis. These data should demonstrate the following as true, if the hypothesis is correct. There was a difference in the cost of ceramics, dating from the pre-industrial period, used by different socio-economic groups. The cost of ceramics used by high level groups will be higher than other groups, and the cost of ceramics used by middle level groups will be higher than lower level groups. In the industrial period, used by different socio-economic groups, ceramic assemblages would show a greater cost difference than observed in the pre-industrial period.

Three types of analyses were used in testing this hypothesis: analysis of ceramic sets, the Wise analysis, and the Miller analysis. The analysis of ceramic sets did not produce sufficient information for making socio-economic interpretations. The number of table and tea sets was surprisingly small given the number of features that were studied. However, sets from Feature 1 in Area D, provided suggestive data on the socio-economic level of one of the households that used the cistern/privy. It was highly probable that the large number of Chinese porcelain tea wares and porcelain tea sets recovered from the feature were used by an upper level socio-economic group, given the high purchase price of these wares. The purchasing power of a middle level group would be such that buying Chinese porcelain vessels would probably be prohibitive, unless the household using the cistern/privy was making an effort to materially demonstrate their socio-economic asperations. These data, unfortunately, related to only one context and do not permit comparisons for hypothesis testing.

The Wise analysis employed the ratio of refined and porcelain sherds to coarse ware sherds, and the ratio of refined to porcelain to derive two status index values for the Wilmington ceramic collections. Application of this analysis to the recovered ceramic sherds suggested that the analysis may work well on purely eighteenth century sites, or on sites earlier than those represented within the project area. However, this analysis did not work on the Wilmington Boulevard collection, thus the results of this analysis could not be used in testing the third hypothesis.

The Miller analysis, on the other hand, clearly demonstrated its utility in study of socio-economic levels. It was possible to measure the ceramic costs, and thus economic level, of four households: one represented by materials from Feature 1 in Area D, another based on ceramics from three features (Dowdall's) in Area A, and two households possibly associated with materials from Level 2A and then Levels 2B and 2C of Feature 2 in Area H. These were the only contexts in the project area suitable for a Miller analysis.

The ceramic assemblage from Feature 1 in Area D probably represented a low to middle level socio-economic household(s) whose ceramic values masked the indices of the relatively higher socio-economic household that also contributed materials to the feature. Assuming that the majority of ceramics in this feature came from the relatively higher level household, the overall ceramic value for this feature is one of the highest in the project area. Even though two types of socio-economic groups may have contributed material to the feature, the ceramic purchases of the upper level household, probably represented by the high number of Chinese porcelain tea wares, makes this feature stand out as being associated with a middle to high level household.

The three features from the lot occupied by Joseph Dowdall exhibited a middle to low index value. Thus, Dowdall could be categorized as a middle to low level socio-economic household. However, it is apparent that materials from at least one of the three features (Feature 15) received materials from both the Dowdall household and the workers at the bottling concern. The index value for this feature is different from the other features only in terms of the ceramic value for bowls. In fact, it is this value for bowls that places the three combined Dowdall features in the middle to low ceramic index level. If this feature is not included in determining Dowdall's socio-economic standing, then the Dowdall household could be classified as a middle level socio-economic one, not middle to low.

The pattern analysis discussed in the Artifact Analysis chapter demonstrated that Feature 2 in Area H contained two different deposits, Level 2A and Levels 2B and 2C. The ceramic index for Level 2A was found to be similar to that for Feature 1 in Area D. This high value for Level 2A was contrary to the low socio-economic level indicated by the historical data on this lot. It has been interpreted that Area H was occupied by a household of declining socio-economic standing at the time Level 2A of the feature was filled. Thus, the Miller analysis was measuring a level of status that the household no longer held. To test this interpretation, data would be needed on the economic and social history of this particular household, derived from sources such as census, tax assessments, and wills. Such detailed historical research was beyond the scope of this project.

The ceramic economic level exhibited for the combined two lower levels was the same as indicated by the historical data on the lot's occupants around 1860, i.e. lower level.

In summary, there is one feature associated with a lower level household, one associated with a middle level household, and two with middle to high level households, one possibly representing a household in economic decline. Unfortunately, this sample of features is too small to address the test implication stating that in the pre-industrial period, there would be differences in the cost of ceramics used by different socio-economic groups. This sample contained only one context from this earlier period, Feature 1 in Area D. Also, the test implication predicting greater cost differences between the groups, in the industrial period, cannot be addressed for the same reason.

As a means of addressing these test implications, we have added other sites to our sample. These sites were derived from Miller's 1980 article and from the Washington Civic Center Report (Garrow 1982). By including these other sites and contexts, we have changed the focus of the third hypothesis from Wilmington to "American" culture in general in the nineteenth century. At first glance, there would appear to be many problems in comparing the ceramic indices from these very different contexts. Some are rural, others urban. They are also from different parts of the eastern United States. Other possible points of difficulty in comparing these sites would be the different markets of each of the site's locales. A third problem, which became apparent in the Miller analysis of Level 2A in Feature 2, Area H, would be that these sites may represent different household developmental cycles, whereby the measured indices reflect past economic standing or even economic aspirations. Time is, of course, not a problem, as Miller considers time in the development of his indices. A final factor which may affect the comparisons of these contexts is difference in function. The sample included domestic sites, mixed domestic and commercial, and predominantly commercial properties.

The functional differences can be dealt with by comparing only domestic or predominantly domestic sites. This would eliminate Walker's Tavern and the glass factory in Portage County, Ohio (Miller 1980). Those contexts that are mixed residential and commercial need not be eliminated, as the ceramics that we used in the Miller analysis more than likely originated from the domestic components of these sites. Other artifact groups and classes, such as bottle glass and materials in the Activities group, relate more to the commercial function of these properties.

Household developmental cycles cannot be dealt with prior to this comparison, given the complexity of collecting data on this variable. For the purposes of this comparison, this variable will be assumed to be a constant. However, as this variable appears to have been a factor in the resulting ceramic index of Level 2A in Feature 2, Area H from Wilmington, this particular context will not be used in this comparison of ceramic values.

For this study, market differences can be combined with the variable of site setting, i.e. rural versus urban. These two variables are linked, in that the types of markets and the cost of materials in rural areas was probably different than those in urban areas, due to different transportation costs

for goods. These two variables cannot be ruled out, and will be considered in the discussion below.

The point that these sites are from different parts of the country is probably not a critical factor, as would be market and the rural/urban setting dichotomy. All the sites are within a similar geographic, and to some extent, political region: the Northeast. The tenant farmer site, located in the Delamarva peninsula, was economically tied, at least in the nineteenth century, to the Northeast, and particularly, Philadelphia, thus the site is linked to the same political and economic system held by the other sites. The same may be said for the Civic Center site in Washington, D.C. The sites in Ohio were, of course, economically linked to New York City, a major center in the Northeast.

Thus, the factors which may have influenced the pattern of ceramic values of these eight sites, were the rural versus urban dichotomy and, as postulated in the third hypothesis, the socio-economic level of the sites' occupants. According to the hypothesis, there should have been an increase in material separation between different socio-economic groups when comparing materials in the pre-industrial period to those from the industrial period (post 1840). Figure 72 in the Artifact Analysis chapter suggests that the ceramic indices for the different socio-economic groups does not dramatically change over time, at least prior to 1860 (which is the latest date of the sampled sites). This suggests that there was no increased separation in the cost of ceramics used by different groups in the post 1840 period as compared to the pre-1840 period. To determine if this is true, the sampled sites were examined in terms of the ceramic indices for those households that could be historically categorized as middle level (and/or middle to high) households, as opposed to those falling into the lower level category. There were no truly high socio-economic level households in this sample. In addition, the indices for sites in rural contexts are compared to those in urban settings. To do these comparisons, the mean ceramic values of these sites were used, rather than the breakdown of the indices by form, as presented in Miller's article (1980). This facilitates the comparisons.

First, the sites were compared in terms of the historically defined socio-economic level of the sites' occupants. The middle level households included the Civic Center site, the cistern/privy from Area D in Wilmington (Feature 1), the Dowdall features, and the glass workers household. The lower level households included the two tenant farmer contexts, the Jonathan Hale log cabin site, and the household associated with Levels 2B and 2C of Feature 2, Area H from Wilmington. A mean value was calculated for these two sets of sites, along with projected index values at two standard deviations around the mean of each site group. The mean for the middle level households was 2.15, with the second standard deviation below the mean as 1.723. The mean for the lower level households was 1.46, with two standard deviations above this mean as 1.725 (Table 91). This suggests that these two site groupings are not from the same population, but barely overlap. Also, the sites within each group relate more to each other than to those in the other group, despite the fact that sites of pre-industrial and industrial periods are present in each group. This further suggests that the cost of ceramics used by a socio-economic group, be it middle or low, remained relatively the same

in the pre and post-1840 periods. This is contrary to the predictions stated in the test implications of the third hypothesis.

TABLE 91. Calculation of Means and Standard Deviations for Mean Ceramic Values of Middle Level versus Lower Level Socio-economic Households

Middle Level Housholds Site	Mean Ceramic Value
Civic Center Site	2.39
Feature 1, Area D	2.25
Dowdall Features	2.07
Glass Factory Worker's House	1.90

$\bar{x} = 2.15$
$s = .21$
$2s = .477$
$\bar{x} \pm 2s = 2.577 - 1.723$ (range)

Lower Level Households Site	Mean Ceramic Value
Levels 2B and 2C, Feature 2, Area H	1.65
Tenant Farmer, Context 2	1.44
Tenant Farmer, Context 1	1.42
Jonathan Hale Log Cabin	1.34

$\bar{x} = 1.46$
$s = .13$
$2s = .26$
$\bar{x} \pm 2s = 1.725 - 1.200$ (range)

When the sites are grouped by urban versus rural setting, the site groups overlap. Rural sites have a 2.032 mean ceramic value at two standard deviations above the mean, and urban sites have a 1.448 mean ceramic value at two standard deviations below the mean (Table 92). At first, this would suggest that the rural versus urban dichotomy was not a factor. However, the sample of sites from these two settings is not really comparable. The sample of rural sites does not include a middle level household, as does the sample of sites in an urban setting. Thus, the influence of site setting, and thus nature of market, cannot be ruled out in terms of the cost of ceramics used by these households.

Both of these comparisons and subsequent interpretations are only suggestive. The sample size, eight sites, is too small to provide statistically valid results. More sites from urban, and especially rural contexts are needed, in addition to sites dating to the last quarter of the nineteenth century.

TABLE 92. Calculation of Means and Standard Deviations for Mean Ceramic Values of Rural versus Urban Sites

Rural

Site	Mean Ceramic Value
Glass Factory Workers' House	1.90
Tenant Farmer, Context 2	1.44
Tenant Farmer, Context 1	1.42
Jonathan Hale Log Cabin	1.34

$x = 1.525$
$s = .254$
$2s = .507$
$x \pm 2s = 2.032 - 1.018$ (range)

Urban

Site	Mean Ceramic Value
Civic Center Site	2.39
Feature 1, Area D	2.25
Dowdall Features	2.07
Levels 2B and 2C, Feature 2, Area H	1.65

$x = 2.09$
$s = .321$
$2s = .642$
$x \pm 2s = 2.732 - 1.448$ (range)

Nevertheless, with this small sample, it appears that in the industrial period, as defined earlier (i.e. post 1840), the material distinctions between socio-economic groups do not become more pronounced when compared to groups in the pre-industrial period, at least as far as ceramics are concerned. The third hypothesis is not supported with these data.

Hypothesis 4

The fourth hypothesis examines consumer behavior in terms of dietary patterns over time. The hypothesis states that in the pre-industrial period, high level socio-economic groups will purchase more costly food items than other social groups. This pattern of food cost difference will become more pronounced in the industrial period, with greater distinctions occurring between all socio-economic level households, but with the middle level groups becoming more similar to high level groups, than to lower level groups. As with the third hypothesis, the fourth is to be tested only with archaeological data. Test implications for this hypothesis predict that the cuts and types of meats from deposits associated with high level groups will be more costly than those associated with middle and low level groups, in the

pre-industrial period. Further, in the industrial period, this cost difference between the groups in terms of cuts and types of meats will be greater than in the previous period.

The faunal analysis demonstrated a wide variation in the types of animals consumed by the historic occupants of the project area. Also, there were changes in the nature of meat processing over time. Animals, such as cow, pig, sheep, and goat were butchered within the lots themselves prior to the turn of the nineteenth century. Faunal materials recovered from occupation levels, and some features dating before 1800, contained elements that would not be present if cuts of meat were obtained from a professional butcher, such as teeth, mandibles, tarsus, and sternum elements from cows. These types of elements did not generally occur within features and occupation levels dating after 1800.

The early deposits containing materials indicative of on-site butchering were from lots associated with high and middle level socio-economic households. No faunal material was recovered from properties occupied by lower level household, dating prior to 1800.

The post-1800 deposits and features all exhibited faunal elements from professional butchering (although evidence of minor amounts of domestic butchering persisted), irregardless of the type of socio-economic level household that occupied a given property. Professionally butchered meats were recovered from the Dowdall features as well as from Levels 2B and 2C, which were associated with a low level household.

Thus, this change in butchering methods, and location of butchering activities appears to have taken place around 1800. It is evident that middle to upper level households, prior to 1800, processed entire animals within their properties. We can assume that because the higher socio-economic level households did not use professional butchers, that the lower level groups also did not use butchers. It is not clear, however, whether the lower level groups purchased and consumed whole animals as did the upper level groups, given the lack of data on the meat products used by these lower level households in the project area. Thus, the hypothesis, at least in terms of cost of meat processing, cannot be tested.

As stated earlier, there were observed differences in the types but not cuts of meats consumed by households in the project area. Faunal materials from the pre-industrial period were generally similar to those from the industrial period, except for the material consumed by the lot occupants in Area H, during the 1850s and 1860s. Both Features 2 and 11 in Area H exhibited the highest wild animal counts in the project area. These wild animal species included fish, crab, clams, oyster, rabbit, and bird (Appendix F). In addition, Feature 2 contained the most sawed pig remains in the project area; and in Feature 11, pig made up the bulk of large domestic mammal remains. This was not observed in any of the other deposits and features in the project area. It should be pointed out that the wild animal remains consisted of small sized fauna, and thus did not actually constitute a bulk of the diet represented with the Features 2 and 11 faunal assemblages. However, these animals were clearly an important secondary food resource.

The occurrence of pig and the high number of wild foods remains within Features 2 and 11, in Area H, may have been related to the low socio-economic level of the households on the block, during 1850 and 1860. These types of foods were less expensive than the types of meat remains recovered from other contexts, such as the Dowdall features, which were associated with a middle level household. This suggests that there was a cost difference in the types of meat consumed by different socio-economic groups in the post 1840 period. However, this is only suggestive, given the small number of contexts associated with households of known socio-economic levels. Unfortunately, the sample of contexts from the pre-industrial period did not include faunal assemblages associated with lower level groups. Thus, the prediction that the cost differences between socio-economic groups in the industrial period were greater than in the pre-industrial cannot be adequately addressed.

One interesting observation from the faunal analysis was the high frequency of oyster shell within Features 15, 17, and 25 on the lot occupied by Dowdall. This high frequency becomes more remarkable given Dowdall's very short occupation of the lot (5 years). It is possible that these remains were from food consumed by the Dowdall household and his workers. However, it is interesting that of all the deposits in the project area, it would be the lot containing Dowdall's bottling establishment that contained the highest shell concentrations. This suggests that the shell may have been used in the production of soda and mineral waters, possibly in the same manner as the marble chips found in these features were used: carbonizing the water.

Even though the faunal analysis did not contribute sufficient data for testing the project's research hypotheses, it did provide important data on the nature of artifactual assemblages recovered from the project area. Often, these data confirmed the interpretations made based on other analyses, when identifying refuse types within the project area deposits. For example, Feature 1 in Area H was interpreted as containing displaced refuse, based on initial field observations and subsequent temporal analysis. The faunal analysis indicated that the faunal assemblage in the feature showed evidence of redeposition of an open, weathered surface refuse deposit.

The analysis of floral materials from the project area did not demonstrate any significant differences or patterns within the various occupation levels or features. Thus, floral data could not be use to test the hypothesis on differences in the dietary patterns of different socio-economic groups over time in Wilmington.